

1-Ag8.3:172

O. E. S. LIBRARY. COP. 2

CON
S
43
E22
no. 172

CONNECTICUT

AGRICULTURAL EXPERIMENT STATION

NEW HAVEN, CONN.

BULLETIN 172, JULY, 1912.

The Net Weight or Volume of Food Products Which are Sold in Packages.

• BY JOHN PHILLIPS STREET.

CONTENTS.

	Page
Introduction	4
Variation in Weight of Foods Packed at the Same Time	6
Significance of Can Sizes	7
Accuracy of Claimed Weight.....	23
Changes in Weight of Dried Fruits	26

The Bulletins of this Station are mailed free to citizens of Connecticut who apply for them, and to others as far as the limited editions permit.

CONNECTICUT AGRICULTURAL EXPERIMENT STATION.

OFFICERS AND STAFF.

BOARD OF CONTROL.

His Excellency, SIMEON E. BALDWIN, <i>ex officio, President.</i>	
PROF. H. W. CONN, <i>Vice President</i>	Middletown
GEORGE A. HOPSON, <i>Secretary</i>	Wallingford
E. H. JENKINS, <i>Director and Treasurer</i>	New Haven
JOSEPH W. ALSOP.....	Avon
WILSON H. LEE.....	Orange
FRANK H. STADTMUELLER.....	Elmwood
JAMES H. WEBB.....	Hamden

STATION STAFF.

ADMINISTRATION.

E. H. JENKINS, PH.D., *Director and Treasurer.*

MISS V. E. COLE, *Librarian and Stenographer.*

MISS L. M. BRAUTLECHT, *Bookkeeper and Stenographer.*

WILLIAM VEITCH, *In Charge of Buildings and Grounds.*

CHEMISTRY.

ANALYTICAL LABORATORY.

JOHN PHILLIPS STREET, M.S., *Chemist in Charge.*

E. MONROE BAILEY, PH.D., C. B. MORRISON, B.S.,

R. B. ROE, B.A., C. E. SHEPARD, *Assistants.*

HUGO LANGE, *Laboratory Helper.*

V. L. CHURCHILL, *Sampling Agent.*

PROTEID RESEARCH.

T. B. OSBORNE, PH.D., *Chemist in Charge.*

MISS E. L. FERRY, A.B., *Assistant.*

MISS LUVA FRANCIS, *Stenographer.*

BOTANY.

G. P. CLINTON, S.D., *Botanist.*

E. M. STODDARD, B.S., *Assistant.*

MISS M. H. JAGGER, *Seed Analyst.*

MISS E. B. WHITTLESEY, *Herbarium Assistant.*

ENTOMOLOGY.

W. E. BRITTON, PH.D., *Entomologist: also State Entomologist.*

B. H. WALDEN, B.AGR., D. J. CAFFREY, B.S.,

H. B. KIRK, *Assistants.*

MISS E. B. WHITTLESEY, *Stenographer.*

FORESTRY.

SAMUEL N. SPRING, M.F., *Forester; also State Forester and State Forest Fire Warden.*

W. O. FILLEY, *Assistant State Forester.*

MISS E. L. AVERY, *Stenographer.*

PLANT BREEDING.

H. K. HAYES, B.S., *Plant Breeder.*

C. D. HUBBELL, *Assistant.*

THE NET WEIGHT OR VOLUME OF FOOD PRODUCTS WHICH ARE SOLD IN PACKAGES.

By JOHN PHILLIPS STREET.

At the January session of 1911 the General Assembly passed the following [Chapter 134] :

An Act concerning the Sale of Food in Package Form.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SEC. 1. Any person who shall sell or offer for sale, food in package form, unless the net quantity of the contents be plainly and conspicuously marked on the outside of the package in terms of weight, measure, or numerical count; provided, that reasonable variations shall be permitted, and that allowances shall be established by rules and regulations made from time to time by the dairy and food commissioner and the director of the Connecticut Agricultural Experiment Station, shall be subject to the penalties provided in chapter 255 of the public acts of 1907.

SEC. 2. The terms "person" and "food" as defined in chapter 255 of the public acts of 1907, shall apply to the provisions of this act, provided, the term "food" as used herein shall not include confectionery and shelled nuts when offered for sale in packages at a price not exceeding ten cents each.

SEC. 3. This act shall take effect from its passage, but no penalty shall be enforced for any violation of the provisions of section one arising from the sale of food prepared and enclosed in package form prior to eighteen months after the passage of this act.

Approved, July 11, 1911.

The following work was undertaken by the writer, at the joint request of Mr. H. F. Potter, the Dairy and Food Commissioner, and the Director of this Station, to provide a basis for making the "rules and regulations" required of them by this statute. The samples referred to were mostly bought by the Commissioner and the examinations were made in the laboratory of this Station.

INTRODUCTION.

All beverages and all very moist or liquid foods, as well as all food products which are preserved for transport and storage by "processing" or sterilizing, are necessarily enclosed in "packages" of some sort. Other sorts of food products, for which closed retail packages are not so necessary, are coming to be sold quite commonly in this way.

This practice has certain advantages. The most obvious of these is the protection from contamination by flies, animals and human manipulation and by the dust and dirt of shop and street. A sealed package gives the buyer a reasonable assurance that he gets the food just as it left the factory and this is particularly important for manufacturers who claim specially clean factories and sanitary methods. Sealed packages also protect from substitution and dishonest manipulation or false weights and measures of a retail dealer. They save the dealer time, trouble and sometimes loss of material, and by their attractive appearance tempt customers.

The use of packages also has its disadvantages. As a rule it increases the cost of food to the consumer. He pays for the attractive and somewhat expensive containers either by increase of price per unit of quantity or by decreased quantity at the standard price. In sealed cartons the purchaser cannot see the food before buying—a serious objection in the case of such things as breakfast foods and dried fruits, which he sometimes finds, on breaking the package, to be infested with insects. This causes trouble if not loss. The size of the container often deceives the buyer as to the amount of material he is buying. Bottles with deeply concave bottoms or panelled sides, and breakfast food cartons, especially of flaked foods, are likely to be quite deceptive.

The tables on the following pages show that many foods are sold in packages containing net weights of odd amounts. For instance, potted ham, 6.5 and 10.5 oz.; peanut butter, 7 oz.; condensed milk, 6 and 14.5 oz.; biscuits, 5.25, 6.25, 12 and 14 oz.; corn flakes, 10.5 oz.; rolled oats, 22 oz.; mince meat, 10 oz. It hardly seems likely that trade exigencies demand these fractional weights, but the size of the package often leads the

consumer to believe that he is receiving more of the food than is actually the case, that is, an even pound or fraction of a pound, whereas the package generally contains less than the nearest even fraction of a pound. Rolled oats, for instance, used to be sold in two pound packages; at the present time it is generally in 22 oz. packages, but with a price no lower, if not higher, than when ten ounces more were delivered. Furthermore, it must be remembered that a No. 1 or No. 2 can of corned beef, for instance, does not mean one or two pounds of the meat, but 12 or 24 oz. The weight of the package is also frequently included in the alleged weight of the product. This is quite general with dried fruits such as raisins, currants and prunes, of which "pound packages" contain 14 or 15 net ounces.

The law above cited was passed to remedy, in part, these conditions and make it possible for the purchaser, if he reads the label, to know just how much food he is obtaining in any particular package. For instance, he will know that the small box of cocoa containing one-fifth of a pound of cocoa and offered to him for ten cents is actually more expensive than one containing one-fourth of a pound and costing twelve cents. He will be informed just how much more of a flavoring extract he is getting in a twenty-five cent bottle than in a ten cent bottle, and will learn that he is obtaining more than 2.5 times as much of the same brand. He will learn that the dried fruits he buys, thinking they weigh a pound, usually weigh only 14 or 15 oz. at most, that the attractively cartoned crackers which look like a half-pound weigh only 6½ ounces, that the bottle of vinegar, cider, or whisky often sold as a quart, actually contains only one-fifth of a gallon.

The consumer, however, must clearly understand the limits to the information afforded by a statement of net weight or measure. Many foods, like canned vegetables and fruits, are and must be packed with more or less water, which is either natural to the product or is directly added. The weight of a can of vegetables, therefore, gives no information either as to the quality of the vegetable or the relative amounts of solid and liquid contained in the can. One can may show a greater net weight than another and yet contain actually less of the vegetable or fruit in question. The statement of weight, therefore, conveys no further information than the amount of material, both solid and liquid, in the

can. The following table of some results of our tests illustrates the matter. Thus one of two brands of canned peas, both of which had about the same net contents, contained 16 ounces of drained peas, and the other only 10.9 ounces, or, in other words, a little more than one-quarter of the contents of one was water and almost one-half the contents of the other.

	Total Net Weight. oz.	Weight of Drained Solids. oz.	Weight of Liquor. oz.	Per Cent Weight of Liquor. oz.
Canned Peas	21.9	16.0	5.9	27.0
" "	21.7	10.9	10.8	49.7
String Beans	20.6	12.8	7.8	37.9
" "	19.0	8.0	11.0	57.9
Peaches	30.5	19.5	11.0	36.1
" "	32.2	16.8	15.4	47.8
Pears	30.8	20.6	10.2	33.1
" "	20.3	11.9	8.4	41.4

VARIATIONS IN WEIGHT OF FOODS PACKED AT THE SAME TIME BY THE SAME MANUFACTURER.

The method of procedure in collecting necessary data was as follows: Through the courtesy of their owners, the writer was given access to the warehouses of two leading wholesale grocers in New Haven and of one prominent retail grocer and opportunity to open and examine any packages of food products. Cases of canned goods, containing from one to three dozen cans, were opened and the gross weight of each individual can determined in grams on an accurate balance. The lightest and heaviest samples of each lot were bought by the dairy and food commissioner, numbered and sent to the laboratory, where the contents were removed and the can or container cleaned, dried and weighed. In this way the net weights of the contents of the lightest and heaviest packages of each food were obtained; likewise the weights of the empty containers, showing their variation in weight, if any. While of course it would have been preferable actually to determine the net weight of every package weighed, this was impracticable from the standpoint of time and expense, but it is believed that the data secured show with reasonable accuracy how uniformly any one manufacturer can and does pack his product as regards weight. In certain cases, for various reasons, less than twelve packages of a brand were

weighed, but such are exceptional. About 2,000 packages in all were weighed, representing 150 brands of about 75 kinds of foods. It was impossible to cover the whole field at this time, either as regards kind of food or size of package. For instance, with vegetables and fruits we limited ourselves to the sizes most commonly used, Nos. 2 and 3, and the data are quite complete for these particular sizes.

The work here described is, of course, only a beginning of what needs to be done and is but a single contribution to it. The State law, however, calls for immediate action in the matter without waiting for a complete survey of all the trade conditions and practice. The results given in this bulletin show what degree of uniformity in quantity is at present actually secured by packers of standard brands. It may be that greater uniformity is practicable and desirable, but in any case as great accuracy as is now obtained without specific legal requirement by some, should be demanded of all.

SIGNIFICANCE OF CAN SIZE.

Frequently consumers, and even dealers, are confused as to the meaning of No. 1, No. 2, No. 3, etc., when applied to canned vegetables, fruits, etc. In the past when the consumer purchased a can of peas or corn marked 2, he believed he was getting two pounds of the vegetable, whereas in fact he received only 20 to 22 ounces. This statement is confirmed by the following extract from a letter recently received by the writer from a prominent can manufacturer:

"The sizes designated as No. 1, No. 2, No. 2½ and No. 3 were formerly known to the trade as 1 lb., 2 lb., 2½ lb. and 3 lb. However, these latter names were misleading for the reason that none of the sizes holds the weight which these terms would indicate, hence the change to the terms now in use."

The writer inquired of two prominent can manufacturers as to the dimensions of the various sizes of standard cans, and the following is a summary of their statements. The cans are of two general classes, the hole and cap or soldered cans, and the "sanitary" cans in which no solder is used, except on the side seam. The dimensions of the two styles of can vary slightly, but the capacities of the respective sizes are the same.

TABLE I.—*DIMENSIONS OF STANDARD CANS.

Size.	Height. in.	Sanitary Diameter. in.	Height. in.	Hole and Cap. Diameter. in.
No. 1	4	2 $\frac{5}{8}$	4	2 $\frac{1}{16}$
No. 2	4 $\frac{1}{2}$	3 $\frac{3}{8}$	4 $\frac{9}{16}$	3 $\frac{3}{8}$
No. 2 $\frac{1}{2}$	4 $\frac{11}{16}$	4	4 $\frac{3}{4}$	4
No. 3	4 $\frac{7}{8}$	4 $\frac{1}{4}$	4 $\frac{7}{8}$	4 $\frac{3}{16}$
No. 3, 5 in. Jersey	5	4 $\frac{1}{4}$	5	4 $\frac{1}{4}$
No. 3, 5 $\frac{1}{2}$ in. Jersey	5 $\frac{1}{2}$	4 $\frac{1}{4}$	5 $\frac{1}{2}$	4 $\frac{1}{4}$
No. 10	7	6 $\frac{1}{8}$	6 $\frac{7}{8}$	6 $\frac{1}{4}$

* All outside measurements.

WEIGHT OF CANS.

It is important to determine what degree of uniformity of weight the cans of the same make and size show, for if the weight of cans is nearly uniform the net weight of the contents may be determined with reasonable accuracy without opening the cans. The following table gives the data which we have obtained from our own weighings:

TABLE II.—WEIGHT OF CANS.

Size.	Height. in.	Diameter. in.	Number Weighed.	Lowest. oz.	Weight of Cans. Highest. oz.	Average oz.
I	3 $\frac{1}{8}$	2 $\frac{1}{4}$	2	2.1	2.1	2.1
—	3 $\frac{5}{8}$	3 $\frac{1}{2}$	2	3.6	3.9	3.8
—	4 $\frac{1}{2}$	2 $\frac{7}{8}$	4	2.8	3.1	3.0
2	4 $\frac{1}{4}$	3 $\frac{1}{8}$	2	3.2	3.6	3.4
2 "C"	4 $\frac{9}{16}$	3 $\frac{3}{8}$	16	3.3	4.0	3.6
*2 "C"	4 $\frac{9}{16}$	3 $\frac{3}{8}$	30	3.4	4.0	3.6
2 sanitary	4 $\frac{1}{2}$	3 $\frac{3}{8}$	4	3.6	3.9	3.8
2 miscellaneous	4 $\frac{9}{16}$	3 $\frac{3}{8}$	24	3.4	3.8	3.6
*2 "	4 $\frac{9}{16}$	3 $\frac{3}{8}$	36	3.4	3.9	3.6
—	4 $\frac{1}{2}$	3 $\frac{1}{2}$	2	4.0	4.0	4.0
2 $\frac{1}{2}$ sanitary	4 $\frac{11}{16}$	4	2	4.8	4.9	4.9
2 $\frac{1}{2}$ miscellaneous	4 $\frac{3}{4}$	4	6	4.3	5.1	4.8
3 "C"	4 $\frac{7}{8}$	4 $\frac{3}{16}$	4	4.6	5.4	5.1
3 miscellaneous	4 $\frac{7}{8}$	4 $\frac{3}{16}$	8	4.7	5.3	5.0
3 sanitary	5	4 $\frac{1}{4}$	2	5.6	5.7	5.7

* Data obtained from examination of canned peas in 1909.

The limited number of No. 1 and odd sized cans weighed show great uniformity in weight. One set of cans marked No. 2, and containing imported red peppers, was slightly smaller than standard American No. 2 cans, and also weighed slightly less. One hundred and ten standard No. 2 cans ranged from 3.3 to 4.0 oz., average, 3.6 oz.; forty-six of these cans, stamped "C," ranged from 3.3 to 4.0 oz., average, 3.6 oz.; four stamped "sanitary" ranged from 3.6 to 3.9 oz., average, 3.8 oz.; the remaining sixty of miscellaneous makes ranged from 3.4 to 3.9 oz., average, 3.6 oz. Ninety-one of the one hundred and ten No. 2 cans ranged between 3.5 and 3.8 oz., showing great uniformity, and indicating that an assumed weight of 3.6 oz. for this size of can is approximately correct. The eight No. 2½ cans ranged from 4.3 to 5.1 oz., average, 4.8 oz., showing a slightly greater variation. The twelve No. 3 cans, 4⅞ x 4⅛, ranged from 4.6 to 5.3 oz., average, 5.0 oz., while the two No. 3 cans, 5 x 4¼, weighed 5.6 and 5.7 oz.

From the above the following average weights may be assumed for standard cans of the sizes named:

	oz.
No. 2	3.6
No. 2½	4.8
No. 3 (4⅞ x 4⅛)	5.0
No. 3 (5 x 4¼)	5.7

VEGETABLES.

Six hundred and twenty-three cans of vegetables were weighed, as shown in the following table:

TABLE III.—VEGETABLES.

Kind.	Size of Can.	Number Weighed.	Gross weight.			Weight of Can.			Net weight.			Range of Net Weight.
			Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	
Asparagus	2 1/2	24	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
Asparagus Tips.....	1	24	19.9	20.8	20.4	3.9	4.0	4.0	16.0	16.8	16.4	0.8
Artichokes.....	..	12	26.3	28.5	27.7	4.0	4.1	4.1	22.3	24.4	23.6	2.1
Beans, Red Kidney.....	2	24	24.4	25.7	25.0	3.7	3.7	3.7	20.7	22.0	21.3	1.3
" Ripe Lima.....	2	24	24.3	25.3	25.0	3.6	3.8	3.7	20.7	21.6	21.3	0.9
" Standard String.....	2	24	22.0	22.9	22.5	3.4	3.5	3.5	18.6	19.3	19.0	0.7
" String.....	2	12	22.2	23.6	23.0	3.6	3.6	3.6	18.5	20.0	19.4	1.5
" Fancy Refugee.....	2	24	23.7	24.6	24.0	3.7	3.7	3.7	19.9	20.8	20.3	0.9
" Refugee.....	2	24	23.6	24.7	24.3	3.3	3.9	3.6	20.5	20.8	20.7	0.3
" Yellow Wax.....	2	24	23.9	24.6	24.3	3.4	3.7	3.5	20.5	21.0	20.8	0.5
" Golden Wax.....	2	24	24.1	24.8	24.4	3.5	4.0	3.7	20.6	20.8	20.7	0.2
Pork and Beans, A.....	2	18	25.3	26.1	25.6	3.5	3.6	3.5	21.8	22.5	22.1	0.7
" " B.....	2	12	25.6	26.2	25.9	3.4	3.7	3.5	22.0	22.8	22.4	0.8
Beets, Cherry.....	2	24	24.1	25.4	25.0	3.8	3.8	3.8	20.3	21.6	21.2	1.3
Corn, Sweet.....	2	24	24.6	25.4	24.9	3.5	3.5	3.5	21.1	21.8	21.4	0.7
" Sweet Sugar.....	2	24	24.1	24.7	24.5	3.5	3.7	3.7	20.6	20.9	20.8	0.3
" Maine Fancy.....	2	24	24.0	24.6	24.3	3.5	3.6	3.6	20.4	20.9	20.7	0.5
Mushrooms, Selected Choice.....	..	12	17.8	18.7	18.3	2.8	3.1	2.9	15.0	15.7	15.4	0.7
" Pieces and Stems ..	..	12	17.5	18.3	17.9	2.9	3.1	3.0	14.6	15.2	14.9	0.6
Peas, Sweet Wrinkled.....	2	24	24.8	25.4	25.2	3.3	3.5	3.5	21.5	21.9	21.7	0.4
" Sifted	2	24	24.6	25.0	24.8	3.6	3.9	3.8	21.0	21.1	21.0	0.1
Red Peppers.....	2	18	17.8	21.0	20.1	3.2	3.6	3.5	14.4	17.4	16.6	3.0
" ".....	1	12	9.7	10.5	10.1	2.1	2.1	2.1	7.6	8.4	8.0	0.8
Pumpkin, Golden, starch added.....	3	12	42.5	43.2	42.8	5.0	5.3	5.2	37.5	37.9	37.6	0.4
Pumpkin, Golden, 1st quality.....	3	12	37.7	38.6	38.2	4.6	5.4	5.0	33.1	33.2	33.2	0.1
Spinach, Fancy quality.....	3	12	38.1	39.1	38.5	5.1	5.1	5.1	32.9	34.0	33.4	1.1
Succotash, Green Lima, Fancy.....	2	24	23.0	25.1	24.6	3.7	3.8	3.8	19.3	21.3	20.8	2.0
" 1st quality.....	2	23	23.2	25.1	24.4	3.6	3.6	3.6	19.6	21.6	20.8	2.0
Tomatoes, Hand Packed, Fancy.....	2	24	21.6	24.8	23.3	3.8	3.8	3.8	17.8	21.0	19.5	3.2
Tomatoes, Hand Packed.....	3	12	38.9	42.0	40.3	5.6	5.7	5.7	33.2	36.4	34.6	3.2
" Maryland Special..	3	12	37.0	38.1	37.4	4.7	4.9	4.7	32.3	33.2	32.7	0.9
" Solid	3	12	36.3	38.5	37.7	4.9	5.2	5.1	31.1	33.7	32.6	2.6
" Peeled, Italian.....	..	12	19.6	22.2	21.3	3.6	3.9	3.8	15.9	18.3	17.5	2.4

* 18 oz. or over. † 22 oz. ‡ 15 oz. || 15.5 oz. § 7 oz. claimed weights.

WEIGHTS OF CONTENTS.

Asparagus. 24 samples ranged from 30.7 to 32.2 oz., average, 31.6 oz., 21 of the samples weighing within 0.5 oz. of the average.

Asparagus Tips. 24 samples ranged from 16.0 to 16.8 oz., average, 16.4 oz., all weighing within 0.5 oz. of the average.

Artichokes. 12 samples ranged from 22.3 to 24.4 oz., average, 23.6, 5 weighing within 0.5 oz. and 10 within 1 oz. of the average.

Beans. 24 samples of red kidney beans ranged from 20.7 to 22.0 oz., average, 21.3 oz., 22 weighing within 0.5 oz. of the average. 24 samples of lima beans ranged from 20.7 to 21.6 oz., average, 21.3 oz., all weighing within 0.5 oz. of the average. 36 samples of string beans of two brands ranged from 18.5 to 20.0 oz., average, 19.1 oz., 34 weighing within 0.5 oz. of the average. 48 samples of refugee beans of two brands ranged from 19.9 to 20.8 oz., average, 20.5, 47 weighing within 0.5 oz. of the average, 48 samples of wax beans of two brands ranged from 20.5 to 21.0 oz., average, 20.8 oz., all weighing within 0.5 oz. of the average.

Pork and Beans. 30 samples of two brands ranged from 21.8 to 22.8 oz., average, 22.2 oz., all weighing within 0.5 oz. of the average.

Cherry Beets. 24 samples ranged from 20.3 to 21.6 oz., average, 21.2 oz., 22 weighing within 0.5 oz. of the average.

Corn. 72 samples of three brands ranged from 20.4 to 21.8 oz., average, 21.0 oz., all weighing within 0.5 oz. of the average.

Mushrooms. 24 samples of two brands ranged from 14.6 to 15.7 oz., average, 15.2 oz., all weighing within 0.5 oz. of the average.

Peas. 48 samples of two brands ranged from 21.0 to 21.9 oz., average, 21.4 oz., all weighing within 0.5 oz. of the average.

Red Peppers. 18 samples in No. 2 cans ranged from 14.4 to 17.4 oz., average 16.6 oz., 9 weighing within 0.5 oz., and 16 within 1 oz. of the average. 12 samples in No. 1 cans ranged from 7.6 to 8.4 oz., average, 8.0 oz., all weighing within 0.5 oz. of the average.

Pumpkin. 12 samples, containing added starch, ranged from 37.5 to 37.9 oz., average, 37.6 oz. 12 other samples ranged from 33.1 to 33.2 oz., average, 33.2 oz. All 24 samples weighed within 0.5 oz. of the averages.

Spinach. 12 samples ranged from 32.9 to 34.0 oz., average, 33.4 oz., 10 weighing within 0.5 oz. of the average.

Succotash. 47 samples of two brands ranged from 19.3 to 21.6 oz., average, 20.8 oz., 39 weighing within 0.5 oz. and 45 within 1 oz. of the average.

Tomatoes. 24 samples of "hand packed" in No. 2 cans ranged from 17.8 to 21.0 oz., average, 19.5 oz., 13 weighing within 0.5 oz. and 17 within 1 oz. of the average. 12 samples in No. 3 cans ($4\frac{1}{8} \times 4\frac{1}{8}$) ranged from 31.1 to 33.7 oz., average, 32.6 oz., 10 weighing within 0.5 oz. and 11 within 1 oz. of the average. 12 samples in No. 3 cans ($5 \times 4\frac{1}{4}$) ranged from 33.2 to 36.4 oz., average, 34.6 oz., 4 weighing within 0.5 oz. and 7 within 1 oz. of the average. 12 samples of "Maryland" tomatoes in No. 3 cans ($4\frac{1}{8} \times 4\frac{1}{8}$) ranged from 32.3 to 33.2 oz., average, 32.7 oz., 11 weighing within 0.5 oz. and all within 1 oz. of the average. 12 samples of imported stock in odd-sized cans ranged from 15.9 to 18.3 oz., average, 17.5 oz., 7 weighing within 0.5 oz. and 11 within 1 oz. of the average.

Summary. The uniformity in weight of the contents of individual cans of the same brand of vegetables, excepting artichokes, peppers, succotash and tomatoes, is very striking, and it appears

that, in general, the manufacturer at present packs a fairly uniform amount of the vegetable in cans of the same size. Of the 354 samples of beans (various kinds), pork and beans, beets, corn, peas and peppers, in No. 2 cans, 347 weighed within 0.5 oz. of the respective averages. Pumpkin and spinach in No. 3 cans showed similar uniformity. On the other hand, artichokes, peppers (No. 1 cans), succotash, and "hand packed" or "solid" tomatoes showed wider variations, especially the tomatoes. The "Maryland" tomatoes, which are of inferior quality and contain more water and less pulp, show much greater uniformity in weight than the higher grade tomatoes.

From the above data it would seem fair to make the following allowances of variation in quantity for canned vegetables:

SUGGESTED ALLOWANCES OF VARIATIONS FOR VEGETABLES.

Kind.	Size.	Allowance. oz.	Per cent.
Asparagus	2½	0.5	1.6
" Tips	1	0.5	3.0
Artichokes	?	1.0	4.0
Beans, Kidney	2	0.5	2.4
" Lima	2	0.5	2.4
" String	2	0.5	2.6
" Refugee	2	0.5	2.4
" Wax	2	0.5	2.4
Pork and Beans	2	0.5	2.2
Beets	2	0.5	2.4
Corn	2	0.5	2.4
Mushrooms	-	0.5	3.3
Peas	2	0.5	2.3
Peppers	1	0.5	6.0
"	2	1.0	6.0
Pumpkin	3	0.5	1.4
Spinach	3	0.5	1.5
Succotash	2	1.0	4.8
Tomatoes	2	1.0	5.4
" high grade	3	1.0	3.0
" low grade	3	0.5	1.5

FRUITS.

One hundred and sixty-four cans of fruits were weighed as shown in the table.

TABLE IV.—FRUITS.

Kind.	Size of Can.	Number Weighed.	Gross weight.			Weight of can.			Gross weight.			Range of Net Weight.
			Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	
Cherries, Extra Standard . . . . .	..	12	35.7	37.0	36.2	4.8	4.9	4.8	30.8	32.2	31.4	1.4
" White, Extra Quality	2	24	23.2	24.9	24.1	3.4	3.5	3.4	19.8	21.4	20.7	1.6
" Maraschino	Jar.	8	54.9	55.4	55.2	23.9	23.9	23.9	31.0	31.6	31.3	0.6
Peaches, Pie	3	12	36.4	38.2	37.4	4.8	5.1	5.0	31.3	33.1	32.4	1.8
" Yellow Free . . . . .	..	12	34.5	36.1	35.4	4.8	4.9	4.9	29.7	31.3	30.5	1.6
" Sliced Lemon Cling . . . . .	..	12	35.0	36.5	35.9	4.7	5.1	4.9	30.3	31.4	31.0	1.1
Pears, Extra Bartlett	2	24	23.1	25.3	24.8	3.8	3.9	3.8	19.4	21.3	21.0	1.9
" Bartlett . . . . .	..	12	34.4	36.3	35.1	4.3	4.9	4.6	30.1	31.5	30.5	1.4
Pineapple, Hawaiian	2	24	25.7	27.6	26.9	4.0	4.0	4.0	21.8	23.6	22.9	1.8
Plums, Extra Lombard	2	24	24.4	25.1	24.8	3.6	3.8	3.7	20.9	21.3	21.1	0.4

* 30 oz. claimed weight.

The variation in weight of the containers has already been discussed under vegetables.

WEIGHTS OF CONTENTS.

Cherries. 12 samples ranged from 30.8 to 32.2 oz., average, 31.4 oz., 9 weighing within 0.5 and all within 1 oz. of the average. 24 samples in No. 2 cans ranged from 19.8 to 21.4 oz., average, 20.7 oz., 20 weighing within 0.5 oz. and all within 1 oz. of the average. 8 samples of Maraschino cherries in glass jars ranged from 31.0 to 31.6 oz., average, 31.3 oz., all weighing within 0.5 oz. of the average.

Peaches. 12 samples in No. 3 cans ranged from 31.3 to 33.1 oz., average, 32.4 oz., 9 weighing within 0.5 oz. and all within 1 oz. of the average. 24 samples in cans, 4 1/4 x 4, ranged from 29.7 to 31.4 oz., average, 30.8 oz., 14 weighing within 0.5 oz. and all within 1 oz. of the average.

Pears. 24 samples in No. 2 cans ranged from 19.4 to 21.3 oz., average, 21.0 oz., 23 weighing within 0.5 oz. of the average. 12 samples in cans, 4 3/4 x 4, ranged from 30.1 to 31.5 oz., average, 30.5 oz., 9 weighing within 0.5 oz. and 11 within 1 oz. of the average.

Pineapple. 24 samples in No. 2 cans ranged from 21.8 to 23.6 oz., average, 22.9 oz., 18 weighing within 0.5 oz. and 22 within 1 oz. of the average.

Plums. 24 samples in No. 2 cans ranged from 20.9 to 21.3 oz., average, 21.1 oz., all weighing within 1 oz. of the average.

Summary. The uniformity in weight is not as great in packages of fruit as in those of vegetables, but is reasonably satisfactory. On account of the larger size of the fruits a somewhat larger allowance in weight should be made. The following allowances seem to be fair:

SUGGESTED ALLOWANCES OF VARIATION OF WEIGHT FOR FRUITS.

Kind.	Size.	Allowance.	Per cent.
Cherries	2	0.5	2.4
"	3	1.0	3.2
Peaches	3	1.0	3.2
Pears	2	0.5	2.4
"	3	1.0	3.3
Pineapple	2	1.0	4.4
Plums	2	0.5	2.4

FISH, MEATS AND SOUP.

One hundred and twenty cans of fish, nine brands, one hundred and two of meats, six brands, and forty-two of soups, three brands, were weighed. The cans were of varying shapes and sizes and the size has quite a different significance from that in the case of vegetables.

TABLE V.—FISH, MEATS AND SOUPS.

Kind.	Size of Can.	Gross weight.			Weight of Can.			Net weight.			Range of Net weight.	
		Number Weighed	Lowest.		Highest.		Average.		Lowest.			
			oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.		
Clams, Underwood's.....	..	12	18.7	19.5	19.2	2.8	3.1	3.0	15.6	16.4	16.2	0.8
" Maine.....	..	12	18.4	19.2	18.9	2.8	2.8	2.8	14.9	16.3	16.1	1.4
Crab, Extra Fancy Japan.....	..	12	19.8	20.6	20.3	3.6	4.2	3.9	16.2	16.4	16.4	0.2
Fish Flakes, Cod and Haddock.....	..	12	9.4	12.2	10.6	2.1	2.2	2.1	7.2	10.1	8.5	2.9
Herrings in Tomato Sauce.....	..	12	22.9	24.6	23.8	5.4	5.7	5.5	17.6	18.8	18.3	1.2
" Kippered.....	..	12	22.4	23.1	22.7	6.0	6.2	6.1	16.2	17.1	16.6	0.9
Tall												
Salmon, Alaska.....	I	12	20.1	21.1	20.8	3.3	3.6	3.5	16.9	17.5	17.3	0.6
" Columbia river, fancy.....	I	12	17.7	19.3	18.6	3.3	3.3	3.3	14.4	15.9	15.3	1.5
" " ".....	½	12	10.0	10.7	10.4	2.4	2.5	2.5	7.6	8.1	7.9	0.5
Shrimp, Barataria.....	..	12	12.7	13.3	13.0	2.3	2.4	2.3	10.3	10.9	10.7	0.6
Bacon, Beech-Nut Sliced.....	Large	12	20.3	21.5	21.1	11.4	11.4	11.4	8.9	10.1	* 9.7	1.2
Beef, " " ".....	Large	12	19.1	20.3	19.6	11.1	11.5	11.3	8.0	8.8	8.3	0.8
Corned Beef.....	I	12	15.3	15.9	15.7	3.6	3.6	3.6	11.7	12.3	12.1	0.6
" " ".....	2	12	28.8	30.3	29.7	5.5	5.5	5.5	23.4	24.8	24.2	1.4
Chicken Boned, extra quality.....	I	12	16.0	17.3	16.8	3.2	3.2	3.2	12.8	14.1	13.6	1.3
Potted Meat, Ham Flavor.....	½	18	5.0	5.3	5.2	1.4	1.4	1.4	3.6	3.9	3.8	0.3
" " " ".....	½	12	7.9	8.3	8.1	2.7	2.7	2.7	5.1	5.5	5.4	0.4
Tongue, Cooked Lunch.....	I	12	16.2	17.1	16.8	4.2	4.3	4.2	11.9	13.2	12.6	1.3
Soup, Mock Turtle.....	Pint	12	20.7	21.6	21.1	3.8	3.8	3.8	16.9	17.7	17.3	0.8
" Tomato.....	I	18	13.6	14.3	13.8	2.3	2.4	2.3	11.3	11.9	** 11.5	0.6
" Puree of Tomato.....	½ pt.	12	10.2	10.7	10.5	2.0	2.1	2.0	8.2	8.6	8.5	0.4

* 9 oz. † 8 oz. ‡ 12 oz. § 3.5 oz. ¶ 6.5 oz. ** 10.5 oz.; claimed weights.

WEIGHTS OF CONTENTS.

Clams. 24 samples of two brands ranged from 14.9 to 16.4 oz., average, 16.2 oz., all weighing within 0.5 oz. of the average.

Crab. 12 samples ranged from 16.2 to 16.4 oz., average, 16.4 oz., all weighing within 0.5 oz. of the average.

Fish Flakes. 12 samples ranged from 7.2 to 10.1 oz., average, 8.5 oz., 6 weighing within 0.5 oz. and 10 within 1 oz. of the average.

Herring. 12 samples in tomato sauce ranged from 17.6 to 18.8 oz., average, 18.3 oz., 8 weighing within 0.5 oz. and all within 1 oz. of the average. 12 samples of kippered ranged from 16.2 to 17.1 oz., average, 16.6 oz., all weighing within 0.5 oz. of the average.

Salmon. 12 samples in No. 1 tall cans ranged from 16.9 to 17.5 oz., average, 17.3 oz., 11 weighing within 0.5 oz. of the average. 12 samples in No. 1 flat cans ranged from 14.4 to 15.9 oz., average, 15.3 oz., 10 weighing within 0.5 oz. of the average. 12 samples in flat halves ranged from 7.6 to 8.1 oz., average, 7.9 oz., all weighing within 0.5 oz. of the average.

Shrimp. 12 samples ranged from 10.3 to 10.9 oz., average, 10.7 oz., all weighing within 0.5 oz. of the average.

Bacon. 12 samples ranged from 8.9 to 10.1 oz., average 9.7 oz., 9 weighing within 0.5 oz. of the average.

Sliced Beef. 12 samples ranged from 8.0 to 8.8 oz., average, 8.3 oz., 10 weighing within 0.5 oz. of the average.

Corned Beef. 12 samples in No. 1 cans ranged from 11.7 to 12.3 oz., average, 12.1 oz., all weighing within 0.5 oz. of the average. 12 samples in No. 2 cans ranged from 23.4 to 24.8 oz., average, 24.2 oz., 9 weighing within 0.5 oz. of the average.

Boned Chicken. 12 samples ranged from 12.8 to 14.1 oz., average, 13.6 oz., 11 weighing within 0.5 oz. of the average.

Potted "Ham." 18 samples in $\frac{1}{4}$ tins ranged from 3.6 to 3.9 oz., average, 3.8 oz., 12 samples in $\frac{1}{2}$ tins ranged from 5.1 to 5.5 oz., average, 5.4 oz. All of the 30 samples weighed within 0.5 oz. of the average.

Lunch Tongue. 12 samples in No. 1 tins ranged from 11.9 to 13.2 oz., average, 12.6 oz., 8 weighing within 0.5 oz. of the average.

Soup. 12 samples in pint cans ranged from 16.9 to 17.7 oz., average, 17.3 oz. 18 samples in No. 1 cans ranged from 11.3 to 11.9 oz., average, 11.5 oz. 12 samples in half-pint cans ranged from 8.2 to 8.6 oz., average, 8.5 oz. All of the 42 samples weighed within 0.5 oz. of the averages.

With the exceptions of Fish Flakes, which showed much irregularity in packing, and of Herring, which naturally varied because of the size of the fish, these materials showed considerable uniformity in weight.

The following allowances seem reasonable:

SUGGESTED ALLOWANCES FOR VARIATION OF WEIGHT FOR
FISH, MEATS AND SOUPS.

Kind.	Size.	Allowance, oz.	Per cent.
Clams	—	0.5	3.1
Crab	—	0.5	3.0
Fish Flakes	—	0.5	5.9
Herrings in Tomato	—	1.0	5.5
" Kippered	—	0.5	3.0
Salmon	½	0.5	6.3
"	1	1.0	6.1
Shrimp	—	0.5	4.7
Bacon	large	0.5	5.2
Sliced Beef	"	0.5	6.0
Corned Beef	1	0.5	4.1
" "	2	1.0	4.1
Boned Chicken	1	0.5	3.7
Potted Ham	¾	0.25	6.6
" "	½	0.25	4.6
Lunch Tongue	1	0.75	6.0
Soup	½ pint	0.25	2.9
"	pint	0.5	2.9
"	1	0.5	4.3

PRESERVES, JELLY, SYRUPS, MOLASSES, HONEY, PICKLES,
KETCHUPS AND CONDENSED MILK.

Two hundred and fifty-seven packages of these products were weighed. All of the tin cans and most of the glass bottles of the same size showed fairly uniform weights. The glass bottles and jars containing peanut butter, maple syrup and ketchup, however, showed wide weight variations, and therefore with these products their gross weight is not a safe indication of the uniformity of the pack.

TABLE VI.—PRESERVES, JELLY, SYRUPS, MOLASSES, HONEY, PICKLES, KETCHUPS, AND CONDENSED MILK.

Kind.	Claimed Weight. oz.	Number Weighed.	Gross weight.			Wt. of container.			Net weight.			Range of Net Weight. oz.
			Lowest.		Average.	Lowest.		Highest.	Lowest.		Highest.	
			oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	
Peanut Butter.....	7	12	14.0	15.3	14.8	6.8	8.6	7.7	6.7	7.2	7.1	0.5
Preserves, Pineapple.....	..	4	22.0	23.1	22.6	....	....	8.8	13.2	14.3	13.7	1.1
" Plum.....	..	4	22.1	22.6	22.5	....	....	8.7	13.3	13.9	13.7	0.6
" Raspberry.....	..	8	21.9	22.6	22.2	8.7	8.9	8.8	13.2	13.7	13.4	0.5
" Strawberry.....	..	8	21.6	22.9	22.2	8.9	8.9	8.9	12.7	14.0	13.3	1.3
Strawberries, Canned.....	..	12	13.5	14.1	13.8	2.2	2.4	2.3	11.4	11.7	11.5	0.3
Jelly, Currant-Apple.....	..	12	16.5	17.6	17.1	6.9	7.7	7.3	9.6	9.9	9.8	0.3
Maple Syrup, Choicest.....	..	12	30.5	33.1	31.8	11.0	15.6	13.3	17.5	19.4	18.5	1.9
Fancy Syrup, Cane and Maple.....	..	12	17.7	18.0	17.8	7.4	8.3	7.8	9.8	10.3	10.0	0.5
Molasses, New Orleans.....	..	12	33.8	35.2	34.3	3.9	3.9	3.9	29.9	31.3	30.4	1.4
Karo.....	32	12	35.7	36.3	35.9	3.9	4.0	3.9	31.9	32.2	32.0	0.3
Honey, Compound.....	..	6	12.7	13.3	13.0	5.5	5.7	5.6	7.0	7.8	7.4	0.8
Chili Sauce.....	..	12	16.8	17.8	17.3	8.5	8.5	8.5	8.3	9.3	8.8	1.0
Chow Chow Pickles.....	..	11	17.0	17.5	17.3	8.6	8.7	8.7	8.4	8.8	8.6	0.4
Oyster Cocktail Sauce.....	8	12	17.5	17.8	17.7	8.0	8.0	8.0	9.5	9.8	9.7	0.3
Tomato Ketchup, Blue Label.....	..	12	31.1	32.3	32.0	14.1	15.2	14.7	17.0	17.4	17.3	0.4
Sweet Gherkin Pickles.....	..	12	16.8	17.8	17.4	8.7	8.7	8.7	8.1	9.1	8.7	1.0
Sweet Fancy Mixed Pickles.....	..	12	17.0	17.8	17.4	9.3	9.7	9.5	7.6	8.1	7.9	0.5
Sweet Relish Pickles.....	..	12	19.9	21.0	20.6	9.5	10.2	9.9	10.4	10.8	10.7	0.4
Salad Dressing, Durkee.....	3 1/4	12	8.7	9.1	8.9	5.1	5.5	5.3	3.5	3.6	3.6	0.1
Condensed Milk, Magnolia.....	14 1/2	12	16.9	17.0	17.0	2.2	2.3	2.2	14.7	14.9	14.8	0.2
" " Van Camp's.....	6	12	7.6	7.7	7.6	1.5	1.7	1.6	6.0	6.0	6.0	0.0
" " ".....	16	12	19.5	19.9	19.7	2.8	2.9	2.8	16.7	17.1	16.9	0.4
" " Skimmed.....	..	12	14.3	14.5	14.4	2.0	2.1	2.0	12.3	12.4	12.4	0.1

WEIGHTS OF CONTENTS.

Peanut Butter. 12 samples ranged from 6.7 to 7.2 oz., average, 7.1 oz., all weighing within 1 oz. of the average.

Preserves. 24 samples of four varieties ranged from 12.7 to 14.3 oz., average, 13.6 oz., 22 weighing within 0.5 oz. of the average.

Canned Strawberries. 12 samples ranged from 11.4 to 11.7 oz., average, 11.5 oz., all weighing within 0.5 of the average.

Jelly. 12 samples ranged from 9.6 to 9.9 oz., average, 9.8 oz., all weighing within 0.5 oz. of the average.

Maple Syrup. 12 samples ranged from 17.5 to 19.4 oz., average, 18.5 oz. These variations are probably quite as much due to variations in the weight of the bottles as of the contents.

Fancy Syrup. 12 samples ranged from 9.8 to 10.3 oz., average, 10.0 oz., all weighing within 0.5 oz. of the average.

Molasses. 12 samples ranged from 29.9 to 31.3 oz., average, 30.4 oz., all weighing within 0.5 oz. of the average.

Karo. 12 samples ranged from 31.9 to 32.2, average, 32.0 oz., all weighing within 0.5 oz. of the average.

Honey. 6 samples ranged from 7.0 to 7.8 oz., average, 7.4 oz., all weighing within 0.5 oz. of the average.

Pickles, Relishes, Ketchups. 59 samples ranged from 7.6 to 9.8 oz., average, 8.7 oz., all weighing within 0.5 of the average. 12 samples of ketchup ranged from 17.0 to 17.4 oz., average, 17.3 oz., all weighing within 0.5 oz. of the average. 12 samples of sweet relish ranged from 10.4 to 10.8 oz., average, 10.7 oz., all but one weighing within 0.5 oz. of the average.

Salad Dressing. 12 samples ranged from 3.5 to 3.6 oz., average, 3.6 oz., all exceedingly uniform.

Condensed Milk. 48 samples showed scarcely any variation in weight in packages of the same brand, all weighing within 0.25 oz. of the respective averages.

SUGGESTED ALLOWANCES FOR VARIATION IN WEIGHT.

Material.	Size.	Allowance. oz.	Per cent.
Peanut Butter	—	0.5	7.0
Preserves	—	0.5	3.7
Jelly	—	0.25	2.6
Maple Syrup	Imperial Medium	1.0	5.4
Fancy Syrup	—	0.5	5.0
Molasses	2	1.0	3.3
Karo	2	1.0	3.1
Honey	—	0.5	6.8
Chili Sauce	—	0.5	5.7
Chow Chow Pickles	—	0.5	5.8
Ketchup	½	0.25	2.6
“	1	0.5	2.9
Sweet Pickles	—	0.5	6.0
“ Relish	—	0.5	4.7
Salad Dressing	—	0.25	7.0
Condensed Milk	baby	0.25	4.1
“ “	family	0.25	1.8
“ “	tall	0.50	3.0

CRACKERS AND BISCUITS.

Two hundred and thirty-five packages were weighed, representing eight manufacturers and twenty-seven brands. All but one of the samples from the National Biscuit Co. and two of the three samples from the Johnson Educator Food Co. guaranteed both the number of biscuits and their weight on the package. The deviations from guaranteed weight were exceedingly small,

TABLE VII.—CRACKERS AND BISCUITS.

CRACKERS AND BISCUITS.

19

Kinds.	Net weight. Number member. Weighted.	Gross weight.		Weight of container.		Net weight.		No. of crackers.		Average. Range of net weight.
		Lowest.	Highest.	Lowest.	Average.	Lowest.	Highest.	No. crackers.	Lowest.	
80% Gluten Biscuit. Kellogg.....	oz.	4	7.7	8.5	oz.	oz.	oz.	115	..	70 0.8
40% Breakfast Toast. Kellogg.....	..	9	4.3	5.3	4.3	1.6	1.8	1.7	3.5	37 0.8
Educator Toasterettes. Johnson.....	..	12	10.6	11.1	10.9	..	1.9	8.7	9.2	9.0 0.5
“ Animal Crackers. Johnson.....	12-14	12	16.3	18.2	17.1	5.5	5.8	10.8	12.4	11.4 1.6
“ Fruited. Johnson.....	14-16	5	20.0	20.9	20.5	5.8	6.1	13.9	14.8	14.4 1.6
Japanese Friendship Wafers. B. & V. B.....	..	5	14.3	14.6	14.4	..	..	10.7	11.0	10.8 ..
Bostonia Sugar Wafers. Gilman.....	..	10	6.6	7.6	7.0	3.4	3.5	3.2	4.1	3.5 ..
Chocolate Sugar Wafers. H. & P.....	..	7	6.1	6.6	6.3	..	2.9	3.2	3.7	3.4 ..
Republic Chocolate Wafers. G. J. R.....	..	12	18.7	20.0	19.5	6.2	6.2	12.5	14.3	13.3 ..
Festino Almonds. N. B. Co.....	4½	6	7.8	8.2	8.0	..	..	4.8	5.2	5.1 ..
Chocolate Tokens. “.....	6	12	7.3	8.4	7.9	1.9	1.9	5.4	6.5	6.0 ..
Champagne Wafers. “.....	5	12	8.4	9.8	9.2	3.9	3.9	4.6	6.0	5.3 ..
Nabisco-Chocolate. “.....	2½	12	5.2	6.0	5.6	2.5	2.6	2.6	3.6	3.0 ..
“ Vanilla. “.....	6½	8	10.2	10.8	10.6	..	4.1	6.0	6.7	6.5 ..
Social Tea Biscuit. “.....	6½	9	7.8	8.2	8.0	1.4	1.5	6.3	6.7	6.6 ..
Frotana. “.....	8½	10	9.2	10.2	9.8	1.4	1.4	7.7	8.8	8.4 ..
Saltine Biscuit. “.....	5½	10	7.3	8.3	7.7	2.0	2.1	5.3	6.1	5.6 ..
Five O'Clock Tea Biscuit. N. B. Co.....	6½	6	13.0	15.0	14.0	3.2	3.5	9.8	11.5	10.7 ..
Baronet Biscuit. N. B. Co.....	6½	7	19.9	20.8	20.3	5.8	5.8	14.1	15.1	14.5 ..
Fig Newtons. “.....	8½	8	9.6	11.5	10.4	1.4	1.6	1.5	8.1	10.0 ..
Uneda Lunch Biscuit. N. B. Co.....	4½	8	5.8	6.5	6.2	1.4	1.4	4.4	5.1	4.8 ..
Hydrox Chocolate Biscuit. L. W.....	..	4	13.9	14.3	14.1	..	6.0	7.8	8.3	8.1 ..
Sunshine Brandywine. “.....	..	8	8.1	9.3	8.8	3.4	3.5	4.4	5.9	5.4 ..
“ Véroniques. “.....	..	12	4.6	5.0	4.8	..	2.7	1.9	2.2	2.1 ..
“ Tan-San. “.....	..	8	4.7	5.2	5.0	2.2	2.4	2.3	3.0	2.6 ..
“ Butter-Thin. “.....	..	1	..	8.8	..	1.7	..	7.1	..	49 ..

and in general the number of crackers present was accurately stated. Two hundred and eleven samples weighed within 0.5 oz. and all within 1.0 oz. of their respective averages.

SUGGESTED ALLOWANCES FOR VARIATION IN WEIGHT.

	Allowance. oz.	Percent.
2 oz. and less	0.125	6.3
Over 2 oz. and up to 4 oz.	0.25	6.3
Over 4 oz. and up to 8 oz.	0.25	3.1
Over 8 oz. and up to 1 lb.	0.5	3.1

TABLE VIII.—PASTES, PREPARED FLOUR, BREAKFAST FOODS, BAKING POWDER AND MISCELLANEOUS.

Kind.	Claimed weight. oz.	Number Weighed.	Gross weight.			Wt'g of Contain'r.			Net weight.			Range of Net weight. oz.
			Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	
Alimentary Paste, Mezzani	16	12	16.5	17.7	17.1	0.9	0.9	0.9	15.6	16.8	16.2	1.2
Macaroni, Medium Egg	16	12	15.0	17.9	16.7	1.6	1.6	1.6	13.4	16.3	15.1	2.9
" Egg Elbow	16	12	16.0	17.2	16.8	1.2	1.3	1.2	14.7	15.9	15.6	1.2
" Anger's Golden Seal	12	6.6	7.7	7.1	7.1	1.0	1.1	1.0	5.5	6.7	6.1	1.2
Noodles, Fine Egg.....	...	12	9.3	10.0	9.7	2.2	2.3	2.2	7.2	7.8	7.5	0.6
" Medium Egg .....	...	12	9.8	10.4	10.1	1.8	2.0	1.9	7.9	8.5	8.2	0.6
Spaghetti, Egg Elbow	16	12	16.0	17.3	16.8	1.3	1.4	1.4	14.6	16.0	15.4	1.4
" Italian Style	No. 2	36	24.7	25.5	25.1	3.5	3.6	3.6	21.0	21.9	21.5	0.9
Vermicelli, Superior White .....	...	12	16.4	16.9	16.6	2.1	2.2	2.1	14.3	14.8	14.5	0.5
Flour, Self-Raising Prepared	24	12	24.9	25.1	25.0	1.2	1.2	1.2	23.7	23.9	23.8	0.2
" Pancake	32	12	33.5	33.9	33.7	1.8	1.8	1.8	31.8	32.1	31.9	0.3
Corn Flakes, Kellogg's	10 1/2	12	11.3	13.9	12.7	2.6	2.8	2.6	8.7	11.1	10.1	2.4
" " Quaker .....	...	12	11.9	12.3	12.1	2.8	2.9	2.9	9.0	9.5	9.2	0.5
*Oats, Rolled, Bufceco .....	...	12	30.7	33.8	32.6	7.3	9.6	8.5	23.4	23.9	24.1	0.5
" " Quaker	22	12	24.1	24.9	24.6	2.0	2.1	2.1	22.0	22.8	22.5	0.8
Farina, Hecker's Cream	32	12	34.9	35.6	35.1	2.6	2.9	2.7	32.3	32.7	32.4	0.4
Baking Powder, Royal	8	12	10.2	10.5	10.3	2.2	2.3	2.3	7.9	8.4	8.0	0.5
" " " "	4	12	5.3	5.5	5.4	1.4	1.5	1.4	3.8	4.0	4.0	0.2
Cocoanut, Shred	4	12	4.3	5.4	4.7	0.7	0.7	0.7	3.6	4.7	4.0	1.1
" " "	8	12	8.9	10.8	9.6	0.9	1.0	0.9	7.9	9.8	8.7	1.9
Mince Meat	10	12	11.5	11.7	11.6	0.7	0.7	0.7	10.9	11.0	10.9	0.1
Crisco .....	...	12	28.5	29.1	28.7	4.4	4.8	4.6	24	24.2	24.1	0.1
Ice Cream Powder, Jell-O .....	...	12	5.4	5.7	5.5	0.6	0.7	0.6	4.8	5.0	4.9	0.2
Tryphosa	7	12	7.3	8.1	7.9	0.7	0.7	0.7	6.6	7.4	7.2	0.8
Split Peas	16	12	16.7	17.1	16.8	0.8	0.8	0.8	15.9	16.4	16.0	0.5

* Each package contained glass-ware of varying size and weight.

Macaroni. 36 one pound packages of three brands ranged from 13.4 to 16.8 oz., average, 15.6, two brands showing a decided tendency towards short weight; 28 weighed within 0.5 oz. and 34 within 1.0 oz. of the averages. 12 samples of smaller size ranged from 5.5 to 6.7 oz., average, 6.1 oz., 11 weighing within 0.5 of the average.

Noodles. 24 samples of two brands ranged from 7.2 to 8.5 oz., average, 7.9 oz., all weighing within 0.5 oz. of the average.

Spaghetti. 12 one pound samples ranged from 14.6 to 16.0 oz., average, 15.4 oz., 11 weighing within 0.5 oz. of the average, but with a tendency toward short weight. 36 samples of cooked spaghetti in No. 2 cans ranged from 21.0 to 21.9 oz., average, 21.5 oz., all weighing within 0.5 oz. of the average.

Vermicelli. 12 samples ranged from 14.3 to 14.8 oz., average, 14.5 oz., all weighing within 0.5 oz. of the average.

Prepared Flour. 24 samples of two brands showed very slight variations in weight, all weighing within 0.25 oz. of the average.

Breakfast Foods. 12 samples of one brand of corn flakes showed considerable variation, ranging from 8.7 to 11.1 oz., average 10.1 oz., 9, however, weighing within 0.5 of the average. 12 samples of another brand of corn flakes all weighed within 0.25 oz. of the average. 24 samples of two brands of rolled oats ranged from 22.0 to 23.9 oz., average, 23.3 oz. The wide variations in gross weight of one brand were due to the varying kinds of glass ware packed with it. 12 samples of farina weighed within 0.25 oz. of the average.

Baking Powder. 24 samples of two sizes all weighed within 0.25 oz. of the respective averages.

Shred Cocoanut. 12 samples, 4 oz. size, ranged from 3.6 to 4.7 oz., average, 4.0 oz., 11 weighing within 0.5 oz. of the average. 12 samples, 8 oz. size, ranged from 7.9 to 9.8 oz., average, 8.7 oz., 5 weighing within 0.5 oz. and 11 within 1.0 oz. of the average.

Mince Meat. 12 samples were practically identical in net weight.

Crisco. 12 samples showed almost identical weights, averaging 24.1 oz., with a range of 0.1 oz.

Ice Cream Powder. 12 samples showed a variation of only 0.2 oz.

Tryphosa. 12 samples ranged from 6.6 to 7.4 oz., average, 7.2 oz., 11 weighing within 0.5 oz. of the average.

Split Peas. 12 samples showed a variation of less than 0.25 oz.

Olives. 48 samples of varying sizes and grades were weighed. 12 samples of Mammoth Queen showed a net weight from 18.0 to 18.4 oz., average, 18.1 oz.; these contained from 31 to 32 olives, weighing 10.4 oz. 12 samples of Selected Queen weighed from 17.8 to 18.1 oz., average, 17.6 oz.; these contained 47 olives, weighing 10.6 oz. 12 samples of Selected Queen, smaller bottle, weighed from 9.8 to 10.4 oz., average, 10.1 oz.; these contained 18 olives, weighing 5.1 oz. 12 samples of Stuffed Olives weighed from 4.8 to 5.1 oz., average, 4.9 oz.; these contained from 20 to 26 olives, weighing 2.4 oz.

SUGGESTED ALLOWANCES FOR VARIATION IN WEIGHT.

Material.	Size.	Allowance. oz.	Per cent.
Macaroni	1 lb.	1.0	6.3
"	½ lb.	0.5	6.3
Noodles	½ lb.	0.5	6.3
Spaghetti, dry	1 lb.	1.0	6.3
" cooked	No. 2	0.5	2.3
Prepared Flour	1½ lbs.	0.25	1.0
" "	2 lbs.	0.25	0.8
Corn Flakes	standard	0.5	5.2
Rolled Oats	small	0.5	2.2
Farina	2 lbs.	0.5	1.5
Baking Powder	¼ lb.	0.125	3.1
" "	½ lb.	0.25	3.1
Shred Cocoanut	¼ lb.	0.5	12.5
" "	½ lb.	1.0	12.5
Mince Meat	—	0.25	2.3
Crisco	1½ lbs.	0.25	1.0
Ice Cream Powder	—	0.25	5.1
Tryphosa	—	0.5	7.0
Split Peas	1 lb.	0.5	3.1
Olives, Mammoth	large	0.5*	2.8
" Selected	large	0.5*	2.8
" "	small	0.5*	5.0
" Stuffed	small	0.25*	5.1

* Or 2 olives.

TABLE IX.—DRIED FRUITS.

Kind.	Number weighted.	Gross weight.			Weight of Container.			Net weight.			Range of net weight.
		Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	
*Apples.....	12	15.2	16.0	15.6	1.2	1.3	1.3	14.0	14.7	14.3	0.7
†Currants.....	12	14.7	15.7	15.4	0.8	0.8	0.8	13.9	14.9	14.6	1.0
†Dates	12	13.3	15.1	14.0	1.1	1.2	1.1	12.2	13.9	12.9	1.7
†Prunes	12	12.9	14.1	13.5	1.1	1.1	1.1	11.9	13.0	12.4	1.1
†Raisins	12	15.6	16.0	15.8	0.7	0.7	0.7	14.9	15.2	15.1	0.3

* In stock one week. † In stock four weeks. ‡ In stock three weeks.

DRIED FRUITS.

Sixty packages of five kinds of dried fruits were weighed. The apples, currants and raisins showed only small variations, 35 of the 36 samples weighing within 0.5 oz. of the averages. With the dates and prunes somewhat larger variations were found, yet 19 of the 24 samples weighed within 0.5 oz. of the averages. For the allowances suggested for dried fruits and a study of the losses in weight they sustain on keeping, see page 26.

ACCURACY OF CLAIMED WEIGHT.

A definite weight was claimed on 594 of the packages examined. Data on this subject are given in the following table. Five hundred and seventeen of the samples either exceed the claimed weight or are deficient by less than 0.25 oz. Of the 77 deficient samples the deficiency in 20 samples appears to be exceptional, 102 other samples of the same brands fully satisfying their claims. The remaining 57 samples, however, have a general tendency towards short weight. The larger size potted ham (6½ oz.), two brands of domestic macaroni, spaghetti, one brand of crackers (12 oz.) and corn flakes are the chief offenders.

The table shows that manufacturers have little difficulty in satisfying the weights they claim for their products, and the tables on preceding pages show that nearly all the products examined are packed with reasonably uniform weight.

In addition to the samples already enumerated, a considerable number have been accurately weighed or measured during the past few years to determine the conformity of the actual weight or measure with that claimed. The results obtained with 478 of these samples are given in the following table. Most of the materials show quite satisfactory agreement of claimed and actual weight. Flavoring extracts and meat extracts showed a slight tendency towards short weight; this was very marked with two samples of gelatin, where less than half of the claimed weight was furnished, and to a less degree with beef, wine and iron, which is very commonly sold short measure.

TABLE X.—ACCURACY OF CLAIMED WEIGHT.

Material.	Claimed weight.	Samples weighed.	No. over-weight or within 0.25 oz.	No. deficient more than 0.25 oz.	Material.	Condensed Milk.....	Claimed weight.	Samples weighed.	No. over-weight or within 0.25 oz.	No. deficient more than 0.25 oz.
String Beans.....	18	12	12	0	"	".....	14 1/2	12	12	0
Pork and Beans.....	22	30	30	0	"	".....	6	12	12	0
Mushrooms.....	15	12	12	0	"	".....	16	12	12	0
Red Peppers.....	15 1/2	18	16	2	Baking Powder.....	".....	8	12	12	0
" "	7	12	12	0	"	".....	4	12	12	0
Peaches.....	30	24	24	0	Shred Cocoanut.....	".....	4	12	9	3
Pears.....	30	12	12	0	"	".....	8	12	12	0
Bacon.....	9	12	12	0	Oyster Cocktail Sauce.....	".....	8	12	12	0
Sliced Beef.....	8	12	12	0	Salad Dressing.....	".....	3 1/4	12	12	0
Corned Beef.....	12	12	11	1	Karo.....	".....	32	12	12	0
Potted Ham.....	3 1/2	18	18	0	Mince Meat.....	".....	10	12	12	0
" "	6 1/2	12	0		Tryptosa.....	".....	7	12	11	1
Tomato Soup.....	10 1/2	18	18	0	Biscuit or Crackers.....	".....	2 3/4	12	12	0
Macaroni, Imported.....	16	10	2		"	".....	4 1/2	14	14	0
" Domestic.....	16	12	2		"	".....	5	12	11	1
" Elbow.....	16	12	1		"	".....	5 1/4	10	10	0
Spaghetti, Elbow.....	16	12	4		"	".....	6	12	11	1
Corn Flakes.....	10 1/2	12	6		"	".....	6 1/4	23	23	0
Rolled Oats.....	22	12	0		"	".....	8 1/2	20	14	6
Farina.....	32	12	0		"	".....	9 3/4	6	6	0
Prepared Flour.....	24	12	9	3	"	".....	12	24	14	10
Pancake Flour.....	32	12	32	0	"	".....	14	5	5	0

TABLE XI.—ACTUAL COMPARED WITH CLAIMED WEIGHT OR VOLUME.

Material.	No. of Samples.	Weight found.			Material.	No. of Samples	Volume Claimed.	Volume found.			
		oz.	oz.	oz.				oz.	oz.	oz.	oz.
Chocolate	2	3.2	3.2	3.4	*Rice	6	15.8	16.4	16.1	16.1	16.1
"	1	2	2	2.0	*Meat Extract	21	2	1.7	2.4	1.9	1.9
"	5	4	3.8	4.1	Lemon Extract	21	1	0.9	1.6	1.3	1.3
"	3	8	8.0	8.6	"	21	2	1.6	2.8	1.9	1.9
Cocoa	5	3.2	3.1	3.6	"	32	2	4	4.0	4.2	4.1
"	3	4	4.1	4.3	Vanilla Extract	21	1	0.9	1.5	1.1	1.1
"	20	8	7.3	9.0	"	45	2	1.5	2.2	1.9	1.9
Paprika	1	5/8	...	0.9	"	6	4	3.6	4.3	3.9	3.9
"	1	1	...	1.0	Other Flav. Extracts	20	1	0.9	1.4	1.1	1.1
"	1	2	...	2.1	"	95	2	1.7	2.6	2.0	2.0
Ginger	1	2	...	2.0	Olive Oil	2	2	2.1	2.3	2.2	2.2
"	11	4	3.9	4.3	"	32	4	3.7	5.3	4.5	4.5
Condensed Milk	1	11	...	11.4	"	6	8	7.1	9.0	8.1	8.1
"	2	12	12.4	12.5	"	4	32	30.5	33.3	31.7	31.7
"	3	16	15.7	16.9	Beef, Wine and Iron	6	8	6.3	8.2	7.5	7.5
Gelatine	2	2	0.95	0.99	"	86	16	11.3	16.5	15.1	15.1
Mince Meat	11	10	10.8	11.8	"						

* Figures refer to weight, not volume.

RELATIVE AMOUNTS OF SOLIDS AND LIQUID IN CANNED FOODS.

It has already been stated in this paper that the net weight of contents gives no certain evidence of the quality of the food in question. The solid and liquid portions of thirty-two of the brands weighed in this investigation were separated by draining and their respective weights determined. Most of the vegetables and fruits were of first quality and the figures show what may be expected in a high-grade article. In other samples, some of which were of lower grade, however, we find relatively large amounts of liquor. In the artichokes, for instance, 46.8 per cent. was liquid. In six brands of string, refugee and wax beans, which may properly be grouped together, the liquid ranged from 37.8 to 57.9 per cent.; in other words, in samples of nearly the same net weight one contained 12.8 oz. of drained beans, the other only 8.0 oz. Both samples of mushrooms showed a large proportion of water, 51.9 and 54.4 per cent. One brand of peaches contained 33.8 per cent. of liquid, while another had 47.8 per cent. The canned strawberries contained 62 per cent. of liquid, while the clams contained 60.9 and 65.8 per cent. These results, of course, include a rather limited number of foods, and a still more limited range of brands, and are published mainly as a matter of record, with the intention of supplementing them by future investigations.

CHANGES IN WEIGHT OF DRIED FRUITS.

Dried fruits, of course, always contain considerable water. Furthermore, it is stated that the use of sulphites or sulphurous acid permits of a lesser degree of drying, and therefore a greater content of water. These products will of course lose moisture pending their sale, the amount depending on method of packing, length of time intervening between packing and sale, method of storage, temperature, amount of exposure to the sun and air currents, etc. It is, therefore, under present conditions, impossible for the manufacturer of such products to label them with net weights which shall be accurate and always represent the exact amount of fruit delivered to the ultimate purchaser. It has already been shown on page 23 that the careful manufacturer need have little difficulty in packing his product so that

TABLE XII.—RELATION OF SOLID AND LIQUID PORTIONS IN CANNED FOODS.

Material.	Size of Can.	*Solid Portion.	Liquid Portion.	*Percent Solid.	Material.	Size of Can.	*Solid Portion.	Liquid Portion.	*Percent Solid.
Asparagus	2 1/2	20.9	10.7	66.1	Cherries, Extra Standard.....	..	18.9	12.6	60.0
“	1	12.1	4.3	73.8	“ White, Extra Qual.	2	11.7	8.9	56.8
Artichokes	..	12.4	10.9	53.2	“ Maraschino.....	..	20.3	11.3	64.2
Beans, Red Kidney	2	15.9	5.4	74.6	Peaches, Pie.....	3	16.8	15.4	52.2
“	..	2	15.1	6.4	“ Yellow Free.....	..	19.5	11.0	63.9
Ripe Lima	..	8.0	11.0	42.1	“ Sliced Lemon Cling.....	..	20.4	10.4	66.2
Standard String	2	9.6	9.6	50.0	Pears, Extra Bartlett.....	2	11.9	8.4	58.6
“	2	12.3	8.3	60.0	“ Bartlett (Cal.).....	..	20.6	10.2	66.9
Fancy Refugee	..	2	12.8	7.8	Pineapple, Hawaiian.....	2	16.6	6.1	73.1
“	..	2	12.1	8.6	Plums, Extra Lombard.....	2	11.7	9.3	55.7
“	..	2	11.6	9.1	Strawberries.....	..	4.4	7.2	38.0
Beets, Cherry	2	16.2	4.8	77.1	Clams, Underwood's.....	..	6.3	9.8	39.1
Mushrooms, Selected Choice	..	7.4	8.0	48.1	“ Maine .....	..	5.3	10.2	34.2
“	..	..	6.8	8.1	Shrimp, Barataria.....	..	4.8	5.9	44.9
Pieces and Stems	..	..	13.9	7.9	“ Olives, Selected Queen.....	..	10.6	7.4	58.9
Peas, Sweet Winkled	2	13.4	7.6	63.8	“ Stuffed .....	..	2.4	2.5	49.0
“	..	2	..	..	..	..	..	..	..

* Includes adhering liquid after draining.

a series of packages will show relatively uniform weights at the start.

To determine the shrinkage of various dried fruits under trade conditions a series of experiments was carried out of a two-fold nature. The first set of tests was made with packages of currants, raisins and prunes, known to be fresh stock and purchased very soon after coming into the hands of the wholesaler. These were weighed immediately on their receipt in the laboratory, and again at intervals of one, two, three, four and six months, being kept all the time in a closet with a front of wire netting and exposed to slight air currents, but no direct draught, at a temperature ranging from 55° to 75° F. This is believed to approximate quite accurately the usual store conditions.

The second set of tests was made with a much larger number of packages of apples, apricots, currants, dates, figs, prunes and raisins bought in the open market, but with no knowledge as to the age of the samples, although presumably they represented the current season's pack. These were weighed on receipt and again at the time of analysis. In the meantime they were kept in a closet with solid front, although it was open more or less every day. The temperature was not recorded, but probably ranged from 50° to 70° F., averaging about five degrees less than in the first series. The intervals between the two weighings ranged from 63 to 150 days.

Fruits from Fresh Stock.

While no weight was claimed for any of these samples, they were presumably sold for one pound packages. The seventeen samples ranged from 15.2 to 16.3 oz., gross, and from 14.1 to 15.4 oz., net weight. Only four packages weighed one pound, gross weight, and none of them one pound, net. There was, therefore, apparently a shortage in weight in most of the samples at the start.

Currants. Eight samples, four each of two brands, were tested. The samples of each brand showed a satisfactory uniformity in weight. Starting with an average net weight of 14.9 oz., one brand lost 0.3, 1.3, 1.3, 1.2 and 1.4 oz., respectively, after 1, 2, 3, 4 and 6 months, or a percentage loss of 2.7, 8.7, 8.7, 8.5 and 9.4, respectively. The other brand of currants, starting with an average net weight of 14.8 oz., lost 1.4, 2.1, 2.2, 2.0 and 2.2 oz. for the same respective periods, or percentage losses of 9.5, 14.2, 14.9, 13.5 and 14.9 respectively.

TABLE XIII.—CHANGES IN WEIGHT OF DRIED FRUITS.
From fresh stock.

Sample No.	Fruit.	Gross weight when purchased.	Net weight after						Per cent. loss after				
			Net weight when purchased.		1 mo.	2 mos.	3 mos.	4 mos.	6 mos.	1 mo.	2 mos.	3 mos.	
			oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	
1	Currants, Butter-Nut.	15.8	15.0	14.6	..	14.1	13.7	13.5	12.7	..	6.0	8.5	9.9
4a	" "	15.3	14.6	..	13.4	13.3	..	13.3	..	8.2	8.9	..	8.9
4b	" "	15.7	15.0	..	13.8	13.6	..	13.6	..	8.0	9.3	..	9.3
4c	" "	15.5	14.8	..	13.6	13.5	..	13.5	..	8.1	8.8	..	8.8
	<i>Average</i>	15.6	14.9	14.6	13.6	13.6	13.7	13.5	12.7	8.7	8.7	8.5	9.4
2	Currants, Chariot	15.8	14.8	13.4	..	12.9	12.8	12.8	9.5	..	12.8	13.5	13.5
3a	" "	15.8	14.8	..	12.7	12.5	..	12.5	..	14.2	15.5	..	15.5
3b	" "	15.8	14.8	..	12.8	12.5	..	12.5	..	13.5	15.5	..	15.5
3c	" "	15.9	14.0	..	12.6	12.5	..	12.5	..	15.4	16.1	..	16.1
	<i>Average</i>	15.8	14.8	13.4	12.7	12.6	12.8	12.6	9.5	14.2	14.9	13.5	14.9
5a	Raisins, Butter-Nut	16.3	15.6	..	14.6	14.3	..	14.1	..	6.4	8.3	..	9.6
5b	" "	16.3	15.6	..	14.6	14.3	..	14.1	..	6.4	8.3	..	9.6
5c	" "	15.3	14.5	..	13.3	12.9	..	12.7	..	8.3	11.0	..	12.4
	<i>Average</i>	16.0	15.2	..	14.2	13.8	..	13.6	..	6.6	9.2	..	10.5
6a	Raisins, Ideal	16.2	15.4	..	14.5	14.4	..	14.4	..	5.8	6.5	..	6.5
6b	" "	16.0	15.2	..	14.4	14.3	..	14.3	..	5.3	5.9	..	5.9
6c	" "	15.3	14.5	..	13.7	13.6	..	13.6	..	5.5	6.2	..	6.2
	<i>Average</i>	15.8	15.0	..	14.2	14.1	..	14.1	..	5.3	6.0	..	6.0
7a	Prunes, Gold Medal	15.6	14.5	..	10.6	10.3	..	10.2	..	26.9	29.0	..	29.7
7b	" "	15.2	14.1	..	10.4	10.2	..	10.1	..	26.2	27.7	..	28.4
7c	" "	15.6	14.5	..	10.7	10.3	..	10.2	..	26.2	29.0	..	29.7
	<i>Average</i>	15.5	14.4	..	10.6	10.3	..	10.2	..	26.4	28.5	..	29.2

All in pasteboard cartons and paraffined paper, except 6a, 6b, 6c, with which no paper was used.

Raisins. Six samples, three each of two brands, were tested. One sample showed 1.1 oz. less net weight than the other two of the same brand. One brand of an average net weight of 15.2 oz. lost 1.0, 1.4 and 1.6 oz., respectively, after 2, 3 and 6 months, or percentage losses of 6.6, 9.2 and 10.5, respectively. The other brand, which unlike all the other samples, was not wrapped in paraffined paper inside the carton, with an average net weight of 15.0 oz., lost 0.8, 0.9 and 0.9 oz., respectively, after 2, 3 and 6 months, or percentage losses of 5.3, 6.0 and 6.0, respectively.

Prunes. Three samples of one brand with an average net weight of 14.4 oz. lost 3.8, 4.1 and 4.2 oz., after 2, 3 and 6 months, or percentage losses of 26.4, 28.5 and 29.2, respectively.

Summary. All of the samples practically ceased to lose moisture after three months, and the loss between the second and third months was in general very slight. In three months' time one sample of currants lost 8.7 per cent., the other, 14.9 per cent.; one sample of raisins, 9.2 per cent., the other, 6.0 per cent.; the sample of prunes, 28.5 per cent.

Fruits from Stock of Unknown Age.

Ninety-five samples were tested, including 12 brands of apples, 2 of apricots, 18 of currants, 8 of dates, 21 of figs, 2 of prunes and 32 of raisins. The intervals between the two weighings ranged from 63 to 150 days, but since, as has already been shown in the other series, dried fruits lose but little less after two months than after three, or even six, months, all the samples may be considered to have sustained their maximum loss under normal trade conditions, and are therefore fairly comparable.

Apples. All of the samples came in cartons, nine with the fruit wrapped in paraffined paper, and three without paper. The use of the paper apparently had little effect in preventing drying. The original net weights ranged from 11.0 to 15.3 oz., average, 13.4 oz.; after from two to three months the losses ranged from 0.4 to 3.0 oz., average, 1.6 oz., showing percentage losses from 3.5 to 22.3, average, 11.9 per cent. Four samples lost from 0.4 to 1.0 oz., four from 1.2 to 2.0 oz., and four over 2.0 oz. Two samples claimed a net weight of one pound when packed; these weighed 15.3 and 14.0 oz. when received by us, the latter showing a marked short-weight.

Apricots. Both of the samples came in cartons with the fruit wrapped in paraffined paper. The original net weights were 13.9 and 15.1 oz., average, 14.5 oz.; after from two to two and one-half months they lost 1.2 and 1.5 oz., average, 1.3 oz., or percentage losses of 8.6 and 10.0, average, 9.3 per cent.

Currants. All of the samples came in cartons with the fruit wrapped in paraffined paper. The original net weights ranged from 11.0 to 16.2 oz., average, 14.4 oz.; after from two to three months the losses ranged from 0.2 to 1.3 oz., average, 0.9 oz., or percentage losses from 1.4 to 10.8, average, 6.2 per cent. One sample claimed one pound weight, and it weighed 16.2 at time of purchase.

Dates. All the samples came in paraffine paper in cartons, except two which were wrapped in several thicknesses of paper. The original net weights ranged from 9.2 to 16.1 oz., average, 11.9 oz.; after six months the losses ranged from 0.4 to 1.9 oz., average, 1.0 oz., or percentage losses from 2.5 to 20.7, average, 8.4 per cent. The greatest loss, 20.7, was exceptional and was probably due to the fact that the dates were in a

TABLE XIV.—CHANGES IN WEIGHT OF DRIED FRUITS.
FROM STOCK OF UNKNOWN AGE.

Fruit.	Days between weighings.	Net weight.		Loss in weight.	Per cent. loss.
		1st.	2d.		
		oz.	oz.	oz.	
APPLES.					
In carton and paraffined paper	91	13.4	10.6	2.8	20.9
	79	13.4	11.4	2.0	15.5
	76	12.6	11.2	1.4	11.1
	75	13.3	10.3	3.0	22.3
	71	14.5	13.7	0.8	5.8
	71	13.9	13.0	0.9	6.1
	70	*15.3	13.2	2.1	14.0
	68	12.6	11.9	0.7	5.6
	64	13.7	12.4	1.3	9.6
Average	74	13.6	12.0	1.6	12.3
In carton; no paper	85	*14.0	12.8	1.2	8.2
	71	11.0	10.6	0.4	3.5
	71	13.6	11.1	2.5	18.6
Average	76	12.9	11.5	1.4	10.5
APRICOTS.					
In carton and paraffined paper	76	15.1	13.6	1.5	10.0
	64	13.9	12.7	1.2	8.6
Average	70	14.5	13.2	1.3	9.3
CURRENTS.					
In carton and paraffined paper	87	15.1	14.5	0.6	3.9
	87	14.4	13.3	1.1	7.6
	87	15.0	14.7	0.3	2.0
	86	16.0	14.7	1.3	8.1
	86	14.9	14.4	0.5	3.4
	85	14.4	12.9	1.5	10.4
	85	11.0	10.4	0.6	5.5
	84	15.5	14.6	0.9	5.8
	80	14.3	13.5	0.8	5.6
	77	15.7	14.5	1.2	7.7
	76	15.2	13.9	1.3	8.6
	72	14.5	13.4	1.1	7.6
	72	15.3	14.1	1.2	7.8
	71	11.4	10.3	1.1	9.6
	70	14.4	14.2	0.2	1.4
	70	14.6	14.4	0.2	1.4
	69	*16.2	15.0	1.2	7.4
	65	11.1	9.9	1.2	10.8
Average	78	14.4	13.5	0.9	6.2

* Claimed 1 lb. net when packed.

† Claimed 1 lb.

TABLE XIV.—CHANGES IN WEIGHT OF DRIED FRUITS—*Cont'd.*
FROM STOCK OF UNKNOWN AGE.

Fruit.	Days between weighings,	Net weight.		Loss in weight.	Per cent. loss.
		1st.	2d.		
		oz.	oz.	oz.	
DATES.					
In carton and paraffined paper	144	13.3	12.5	0.8	6.0
	144	*16.1	15.7	0.4	2.5
	143	11.5	10.8	0.7	6.1
	143	12.0	11.2	0.8	6.7
	142	10.1	9.3	0.8	7.9
	135	† 9.2	7.3	1.9	20.7
	134	10.4	9.4	1.0	9.6
	133	12.5	10.8	1.7	13.6
Average....	140	11.9	10.9	1.0	8.4
FIGS.					
In wooden boxes	88	4.7	4.4	0.3	6.4
	86	5.6	5.0	0.6	10.7
	85	13.1	11.8	1.3	9.9
	81	5.5	5.0	0.5	9.1
	81	14.6	13.8	0.8	5.5
	79	11.9	10.5	1.4	11.8
	79	5.8	5.1	0.7	12.1
	77	5.5	5.0	0.5	9.1
	73	4.9	4.0	0.9	18.4
Average....	81	8.0	7.2	0.8	10.0
In wicker baskets	86	11.7	11.0	0.7	6.0
	81	13.2	12.1	1.1	8.4
	79	14.7	13.4	1.3	8.8
	78	† 14.3	12.9	1.4	9.8
	77	**13.8	12.2	1.6	11.6
	72	9.9	8.9	1.0	10.1
	71	10.6	9.7	0.9	8.5
	70	13.0	12.0	1.0	7.7
	60	12.0	11.2	0.8	6.7
Average....	76	12.6	11.5	1.1	8.7
In paraffined paper	79	3.5	3.0	0.5	14.3
	78	9.2	8.1	1.1	12.0
	77	10.9	9.7	1.2	11.0
Average....	78	7.9	6.7	1.0	12.7
PRUNES.					
In carton and paraffined paper	150	13.5	11.3	2.2	16.3
	133	15.4	13.1	2.3	14.9
Average....	142	14.5	12.2	2.3	15.9

* Claimed 1 lb. net when packed.

† In pasteboard box with loose cover.

Claimed 12 oz. net when packed.

Claimed 1 lb. net.

** Claimed 13½ oz. net when packed.

TABLE XIV.—CHANGES IN WEIGHT OF DRIED FRUITS—*Concl'd.*
FROM STOCK OF UNKNOWN AGE.

Fruit.	Days between weighings.	Net weight.		Loss in weight. oz.	Per cent. loss.
		1st.	2d.		
		oz.	oz.		
RAISINS.					
In carton and paraffined paper	85	15.5	15.0	0.5	3.2
	85	14.9	14.4	0.5	3.4
	85	15.7	15.5	0.2	1.3
	85	15.3	15.0	0.3	2.0
	85	15.9	15.5	0.4	2.5
	85	14.3	13.4	0.9	6.3
	85	16.0	15.7	0.3	1.9
	85	15.3	14.5	0.8	5.2
	84	14.2	13.7	0.5	3.5
	84	††15.9	15.0	0.9	5.7
	83	10.6	9.2	1.4	13.2
	83	††15.5	15.1	0.4	2.6
	82	16.3	15.7	0.6	3.7
	78	15.8	15.3	0.5	3.2
	76	13.7	13.2	0.5	3.6
	75	16.6	15.8	0.8	4.8
	74	15.7	15.0	0.7	4.5
	74	15.4	14.7	0.7	4.5
	74	11.4	11.1	0.3	2.6
	74	16.0	15.6	0.4	2.5
	70	14.5	14.0	0.5	3.4
	70	16.0	15.2	0.8	5.0
	70	16.1	15.2	0.9	5.6
	68	16.3	15.6	0.7	4.3
	67	14.7	14.5	0.2	1.4
	67	†14.6	14.4	0.2	1.4
	63	14.9	14.1	0.8	5.4
	63	15.5	14.8	0.7	4.5
Average	77	15.1	14.5	0.6	4.0
In carton; no paper	83	15.4	14.6	0.8	5.2
	75	15.4	15.0	0.4	2.6
	67	15.5	14.9	0.6	3.9
	63	13.9	12.5	1.4	10.1
Average	72	15.1	14.3	0.8	5.3

†† Claimed 1 lb. gross when packed.

†† Claimed 15-16 oz. gross when packed.

† Claimed 1 lb.

pasteboard box with a loose-fitting cover. Omitting this sample the average loss was only 7.3 per cent.

Figs. Nine of the samples were in wooden boxes, nine in wicker baskets, with paper between the layers of fruit, and three simply wrapped in paraffined paper. The original net weights of the boxed samples ranged from 4.7 to 14.6 oz., average, 8 oz.; after from two and one-half to three months the losses ranged from 0.3 to 1.3 oz., average, 0.8 oz., or percentage losses from 5.5 to 18.4, average, 10.0 per cent. The original net weights of the basket samples ranged from 9.9 to 14.7 oz., average, 12.6 oz.; after from two to three months the losses ranged from 0.7 to 1.6 oz., average, 1.1 oz., or percentage losses from 6.0 to 11.6, average, 8.7 per cent. The original net weights of the samples in paper ranged from 3.5 to 10.9 oz., average, 7.9 oz.; after two and one-half months the losses ranged from 0.5 to 1.2 oz., average, 1.0 oz., or percentage losses from 11.0 to 4.3, average, 12.7 per cent. The average percentage losses were least in the basket samples and greatest in those wrapped in paper. The average loss in the 21 samples regardless of method of packing was 10.0 per cent.

Prunes. The two samples came in paraffined paper in cartons. Their original net weights were 13.5 and 15.4 oz., average, 14.5 oz.; after six months the losses were 2.2 and 2.3 oz., average, 2.3 oz., or 16.3 and 14.9, average, 15.9 per cent. These losses were but little more than half those found in the first series; one sample of the same brand as that used in the first series showed 0.9 oz. less net weight at the time of purchase, indicating that possibly it had been somewhat longer in stock. Assuming an original net weight of 14.4 oz., as in the first series, the loss would have been 3.1 oz., or 21.5 per cent.

Raisins. Twenty-eight samples came in cartons with paraffined paper, and four in cartons without paper. The original net weights of the former ranged from 10.6 to 16.3 oz., average, 15.1 oz.; after from two to three months the losses ranged from 0.2 to 1.4 oz., average, 0.6 oz., or from 1.3 to 13.2, average, 4.0 per cent. The original net weights of samples without paper ranged from 13.9 to 15.4 oz., average, 15.1 oz.; after from two to three months the losses ranged from 0.4 to 1.4 oz., average, 0.8 oz., or from 2.6 to 10.1, average, 5.3 per cent. The average loss on the whole thirty-two samples was 3.9 per cent. One sample claimed 1 lb. gross when packed, another 15-16 oz. gross when packed, and a third 1 lb. The first weighed, when received, 16.6 oz. gross and 15.9 oz. net, the second 16.1 oz. gross and 15.5 oz. net, and the third 15.6 oz. gross and 14.6 oz. net.

Summary. On the average apples showed a loss of 11.9 per cent.; apricots, 9.3 per cent.; currants, 6.2 per cent.; dates, 7.3 per cent.; figs, 10.0 per cent.; prunes, 15.9 per cent.; and raisins, 3.9 per cent. The losses were about half of those shown in the first series, namely, currants, 11.8 per cent.; prunes, 28.5

per cent.; and raisins, 7.6 per cent. The differences are possibly due in part to different storage conditions and in part to the fact that the samples of the second series had probably been in stock some time before their purchase and had dried out partially.

With the above data in mind, showing that dried fruits naturally shrink from 4 to 28 per cent., depending upon the kind of fruit, it is not reasonable to expect that a manufacturer can so label his package as to net weight as to cover all natural conditions liable to occur between the time it is packed and when the consumer buys it. On the other hand, the packer can control the weight of the fruit at time of packing. It seems reasonable and just, therefore, to require the packer to state on the label the net weight of the fruit *when packed*.





University of
Connecticut
Libraries



39153029221209

